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Grazing-Incidence Small-Angle Neutron Scattering (GISANS) and Grazing-Incidence X-Ray Diffraction (GIXD) Comparative Study on Malignant and Benign Human Cancer Cells, Tissues and Tumors under Synchrotron Radiation

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Abstract

In the current study, we have experimentally and comparatively investigated and compared malignant human cancer cells, tissues and tumors before and after irradiating of synchrotron radiation using Grazing-Incidence Small-Angle Neutron Scattering (GISANS) and Grazing-Incidence X-Ray Diffraction (GIXD).

Keywords: Grazing-incidence small-angle neutron scattering; Grazing-incidence x-ray diffraction; Malignant cells; Malignant tissues; Malignant tumors; Benign cells; Benign tissues; Benign tumors; Synchrotron radiation

Introduction

In recent years, work on human cancer prevention, diagnosis and treatment research has been devoted to introduction and application of effective and safe radiation therapy, surgery, chemotherapy, targeted therapy and biospectroscopic methods and techniques [1-59]. We now wish to introduce Grazing-Incidence Small-Angle Neutron Scattering (GISANS) and Grazing-Incidence X-Ray Diffraction (GIXD) biospectroscopic methods and techniques as effective and highly photo/electron-selective methods and techniques for diagnosis and treatment reaction on human malignant cancer cells, tissues and tumors. This reaction using synchrotron radiation as anti-cancer catalyst is reported to be unsuccessful; therefore, we decided to use a supported anti-cancer catalyst system [60-110]. The reaction of different types of human malignant cancer cells, tissues and tumors gave product in good to high yields with excellent anti–cancer properties. The diagnosis and treatment reaction using synchrocyclotron radiation was also studied. It was found that the corresponding human malignant cancer cells, tissues and tumors were formed in good yields [111-131].

Materials, Research Method and Experimental Techniques

Synchrotron radiation supported reagents are unique photo/electron anti-cancer catalysts that have become popular over the last two decades. Synchrotron radiation supported reagents has received considerable attention as an inexpensive, non-toxic and recyclable anti-cancer catalyst for numerous malignant to benign human cancer cells, tissues and tumors transformations, affording the corresponding products in excellent yields and with high selectivity [1-63].

In this work, we have found two different biospectroscopic methods and techniques to be an efficient anti-cancer catalyst in human cancer cells, tissues and tumors at room temperature for the synthesis of benign human cancer cells, tissues and tumors through an one-pot, three-component reaction of malignant human cancer cells, tissues and tumors and synchrotron radiation [64-111]. The reaction of different types of human malignant cancer cells, tissues and tumors gave product in good to high yields with excellent anti–cancer properties. The diagnosis and treatment reaction using Cadmium Oxide (CdO) nanoparticles was also studied. It was found that the corresponding malignant human cancer cells, tissues and tumors were formed in good to moderate yields. A possible transition state is proposed for this reaction that provides more space for the cancer groups

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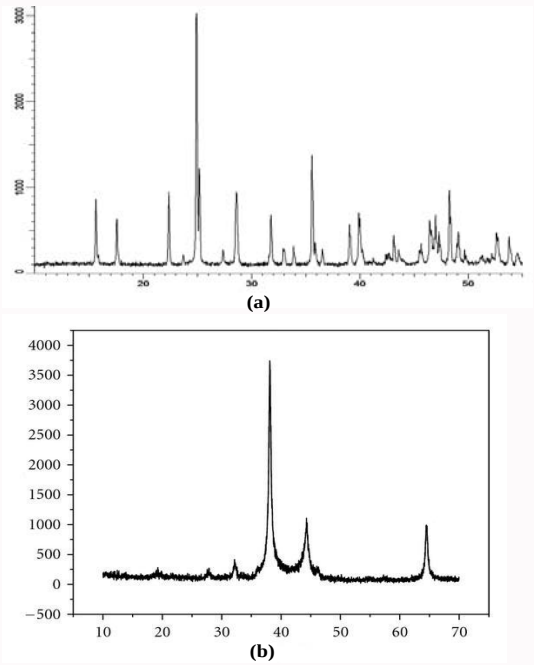

Figure 1: Grazing–Incidence Small-Angle Neutron Scattering (GISANS) analysis of malignant human cancer cells, tissues and tumors (a) before and (b) after irradiating of synchrotron radiation in transformation process to benign human cancer cells, tissues and tumors with the passage of time [1-131].

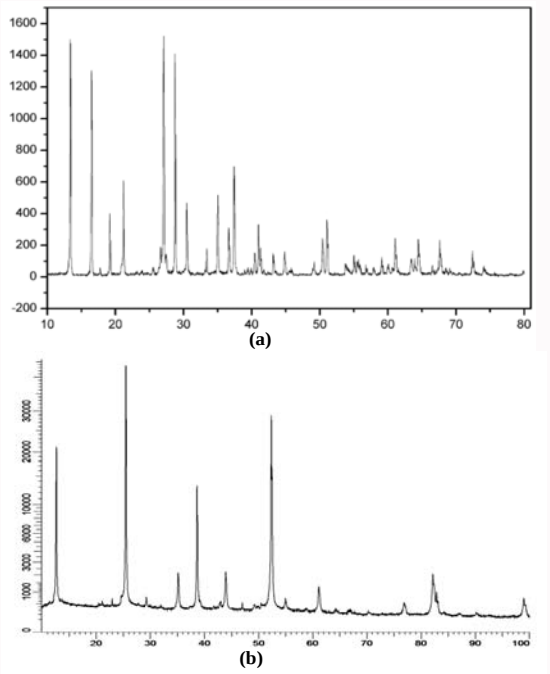

Figure 2: Grazing–Incidence X-Ray Diffraction (GIXD) analysis of malignant human cancer cells, tissues and tumors (a) before and (b) after irradiating of synchrotron radiation in transformation process to benign human cancer cells, tissues and tumors with the passage of time [1–131].

of the human cells and tissues and less steric repulsion between the cancer groups and the anti–cancer catalyst in the anti-cancer, that is, the most stable transition state produces the anti-cancer [112-131].

Results and Discussion

In the current study, we have experimentally and comparatively investigated and compared malignant human cancer cells, tissues and tumors before and after irradiating of synchrotron radiation using Grazing-Incidence Small-Angle Neutron Scattering (GISANS) and Grazing-Incidence X-Ray Diffraction (GIXD). It should be noted that malignant human cancer cells, tissues and tumors were exposed under white synchrotron radiation for 30 days. Furthermore, there is a shift of the spectrum in all of spectra after irradiating of synchrotron radiation that it is because of the malignant human cancer cells, tissues and tumors shrink post white synchrotron irradiation with the passage of time. In addition, all of the figures are related to the same human cancer cells, tissues and tumors. It is clear that malignant human cancer cells, tissues and tumors have gradually transformed to benign human cancer cells, tissues and tumors under synchrotron radiation with the passage of time. Moreover, in all of the figures y-axis shows intensity and also x-axis shows energy (keV) (Figures 1 and 2) [1-131].

Conclusion

It can be concluded that malignant human cancer cells, tissues and tumors have gradually and clearly transformed to benign human cancer cells, tissues and tumors under white synchrotron radiation with the passage of time. It should be noted that malignant human cancer cells, tissues and tumors were exposed under white synchrotron radiation for 30 days. Furthermore, there is a shift of the spectrum in all of spectra after irradiating of synchrotron radiation that it is because of the malignant human cancer cells, tissues and tumors shrink post white synchrotron irradiation with the passage of time. In addition, all of the figures are related to the same human cancer cells, tissues and tumors.

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